

Inhibitory control, word retrieval and bilingual aphasia: Is there a relationship?

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RESEARCH QUESTIONS

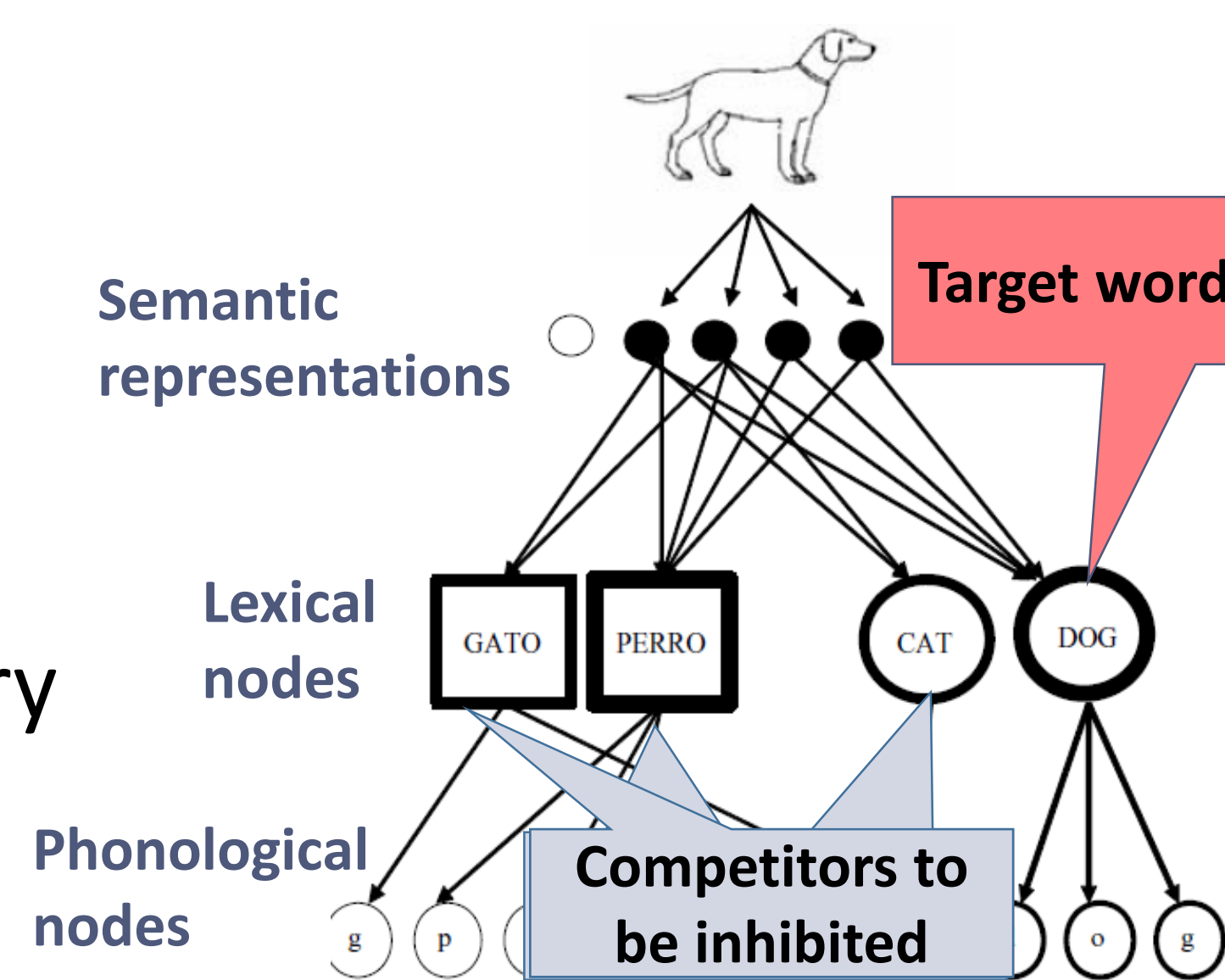
1. Is inhibitory control generally impaired in persons with aphasia (PWA)?
2. Do bilingual and monolingual PWA differ in inhibitory control?
 - Is there a bilingual inhibitory advantage?
3. Is inhibitory control (deficit) associated with word retrieval success in PWA?

BACKGROUND

- **Word retrieval difficulty is the most prominent symptom of aphasia**
- Word Retrieval involves activation and competition of multiple word candidates (e.g., Dell, 1986)
- Non-target words are either actively inhibited or decay (Schade & Berg, 1992)
- Hence word retrieval and inhibitory control could be associated (Shao et al., 2013)
- **Yet, the connection between inhibitory control to word retrieval in aphasia is unclear**

- **Lexical Competition and ensuing Inhibition is greater for bilingual speakers** (words activated in both languages, Green, 1998)
- Evidence for an Inhibitory advantage in healthy bilinguals (Bialystok et al., 2008; but see Paap & Greenberg, 2013)

Lexical access in English-Spanish bilingual speaker (adapted from Costa et al., 2006)



- **It is unclear if a “bilingual inhibitory advantage” is found in aphasia.**

PARTICIPANTS

	Number & Language Background	Age (yr)	Time Post (yr)	Aphasia Severity ^{1*}	Aphasia Type ¹
Monolingual Aphasia (MPWA)	• 18 English speakers, in USA	62.7	5.9	76.7	11 Broca's 5 Anomic 2 Other
Bilingual Aphasia (BPWA)	• 10 bilingual speakers - English L1 & other L2, in USA • 10 bilingual speakers - Tamil L1 & English L2, in India	65.7	6.2	74.9	11 Broca's 6 Anomic 3 Other
Neurologically Healthy (NH)	• 10 monolingual English speakers, in USA • 10 bilingual speakers - Tamil L1 & English L2, in India	60.4		<i>All bilingual participants (healthy and aphasia) were high proficiency early bilinguals</i> <i>*Maximum = 100</i>	

EXPERIMENTAL TASKS

Word Retrieval:

Object Naming¹ & Category Fluency¹ (Animals)

Inhibition:

	Congruent	Incongruent	Neutral
Linguistic (Stroop color-word) ² • In English, and • In Tamil for Tamil-English bilinguals	GREEN	RED	PLAN
Nonlinguistic (Spatial Stroop) ³ or, (Flanker) ⁴			

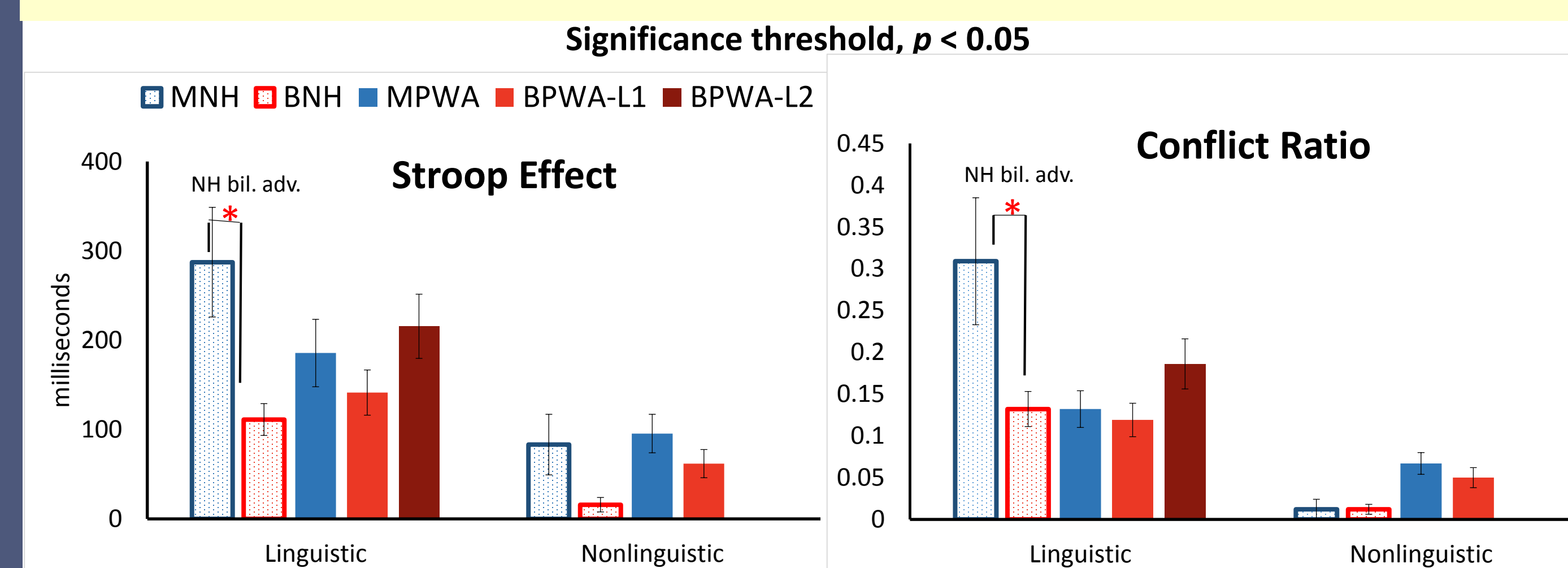
Data analysis:

- Accuracy for both word retrieval tasks
- Response speed of inhibitory tasks to calculate:
 - Stroop effect = Incongruent – Congruent
 - Conflict Ratio⁵ = (Incongruent – Congruent)/Congruent
 - Conflict ratio controls for overall slower responses of PWA relative to healthy controls
- Correlation of Word retrieval and Inhibitory measures

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RESULTS & DISCUSSION



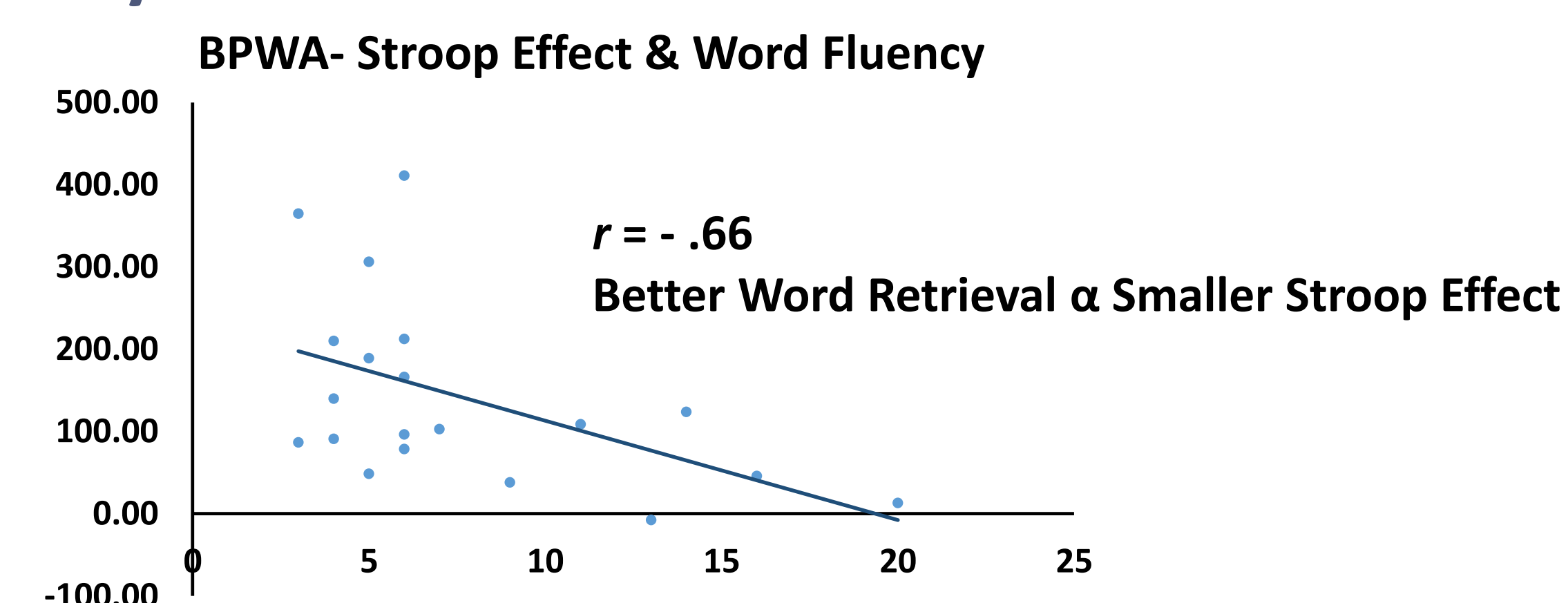
1. Inhibitory control (deficit) in aphasia - NH vs. PWA

- No difference between NH and PWA
- All PWA showed the typical Stroop Effect (slower response for incongruent)

2. Bilingual inhibitory advantage in aphasia - MPWA vs. BPWA

- No difference in any measure (overall RT, linguistic or non-linguistic inhibition) (contra Green et al., 2010)
- NH showed bilingual advantage (Bialystok et al., 2008)

3. Inhibitory control and word retrieval



- Only in BPWA- L1,
- Word fluency strongly correlated with linguistic inhibition (both $r > .6$)
- Object naming's correlations approached significance (both $r > .4$)
- BPWA show a definite connection between inhibitory control and word retrieval in L1

CONCLUSIONS

- **Inhibitory deficits are not pervasive in aphasia**
 - **LIFG damage may be an exception** (e.g., Novick et al., 2010)
- **BPWA show no advantage in inhibition**
- **Word retrieval is strongly associated with linguistic inhibition in BPWA (L1)**